

Community and species diversity of deepwater cephalopods along the northern mid-Atlantic Ridge

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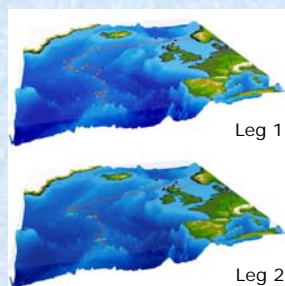
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From 4 June to 5 August 2004 the G.O. Sars expedition along the northern mid-Atlantic Ridge was a major field study initiative under the MAR-ECO project (www.mar-eco.no), a field project under the Census of Marine Life. The multidisciplinary studies covered an area between approximately 42°N to 60°N. In the course of the expedition, an extensive sampling programme for pelagic and demersal nekton was performed, using a suite of research and commercial trawls of different sizes ranging from 1 to 10,000 m² net opening. Sampling covered discrete layers of the water column, partly down close to the seafloor. The net sampling was complemented by ROV observations to a depth of 2,500 m.



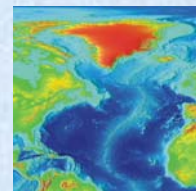
RV G.O. Sars



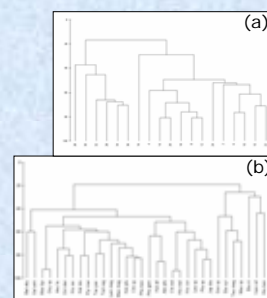
Cruise tracks along the northern mid-Atlantic Ridge



Pictures by Piatkowski, Vecchione & Young



The mid-Atlantic Ridge



Station (a) and species (b) groupings along the northern mid-Atlantic Ridge

Species/Genus/Type	Number	Cephalopods collected during G.O. Sars cruise, leg 1:
<i>Gonatus fabricii/steenstrupi</i>	402	
<i>Mastigoteuthis</i> spp.	95	• 1021 specimens
<i>Teuthowenia megalops</i>	73	• 44 species/'types'
<i>Stauroliteuthis syrtensis</i>	51	• 35 genera
<i>Pyroteuthis margaritifera</i>	48	• 25 families
<i>Heteroteuthis dispar</i>	45	• From all stations!!!
<i>Lampadoteuthis megalops</i>	26	• From all stations!!!
<i>Bathyteuthis abyssicola/berryi</i>	23	• Krill-Trawl: 17 hauls
<i>Galiteuthis armata</i>	22	• Akra-Trawl: 15 hauls
<i>Ancistroteuthis lichtensteini</i>	21	• Egersund-Trawl: 4(5) hauls
.....	• Problem with most cephalopod species: entangled in forenet meshes and then severely damaged.
<i>Bathothauma lyromma</i>	1	
<i>Discoteuthis laciniosa</i>	1	
<i>Grimaldoteuthis bonplandii</i>	1	
<i>Joubiniteuthis portieri</i>	1	
<i>Promachoteuthis</i> sp. nov.	1	
Total	1021	

Catch statistics of leg 1 (northern area)

The work on this comprehensive cephalopod collection is still in progress and results presented here are preliminary. Further scientific work will focus on taxonomy, also including genetic studies. One striking feature is the big collection of specimens of *Gonatus fabricii* and *G. steenstrupi* which both occurred in the area and which will allow detailed studies on these species which are key organisms along the northern mid-Atlantic Ridge system.

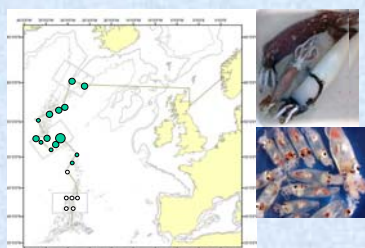
The sampling yielded a total of 1,261 cephalopods, belonging to 29 families, and at least two new species. Cephalopod diversity increased significantly from north to south. The squid genera *Gonatus* and *Mastigoteuthis* were the most abundant cephalopods in terms of numbers. The data constitute one of the biggest cephalopod collections ever made along the mid-Atlantic Ridge and provide new insights into the cephalopod midwater and deep-sea fauna of the Atlantic Ocean.

Station	Species	Number	Shannon	Station	Species	Number	Shannon
2	6	26	1.432	18	5	39	0.805
4	5	44	1.009	20	4	111	0.398
6	9	72	1.420	22	12	30	2.142
8	5	45	0.691	24	13	35	2.023
10	7	63	1.638	26	11	28	2.057
12	3	53	0.425	28	23	64	2.699
14	7	97	0.528	30	12	30	1.987
15	7	32	1.722	32	28	70	3.081
16	2	3	0.636	34	27	78	2.896
				36	24	85	2.764

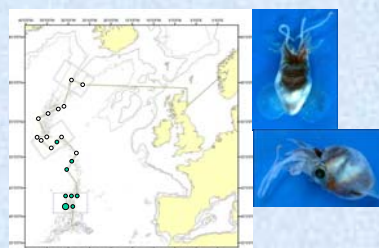
Species/Genus/Type	Number	Cephalopods collected during G.O. Sars cruise, leg 2:
<i>Mastigoteuthis</i> spp.	77	
<i>Gonatus fabricii/steenstrupi</i>	48	• 240 specimens
<i>Stauroliteuthis syrtensis</i>	23	• 31 species/'types'
<i>Grimoteuthis discoveryi</i>	16	• 25 genera
<i>Opisthoteuthis cf. grimaldi</i>	16	• 17 families
<i>Teuthowenia megalops</i>	10	• From all stations!!!
<i>Cirrothauma murrayi</i>	7	• Bottom-Trawl: 22 hauls
<i>Bathyteuthis berryi</i>	6	
<i>Grimaldoteuthis bonplandii</i>	5	• Video outputs of all ROV dives was monitored for cephalopod presence throughout entire dives.
<i>Cirrothauma muelleri</i>	4	
.....	
<i>Bathypolypus pugnator</i>	1	
<i>Discoteuthis laciniosa</i>	1	
<i>Heteroteuthis dispar</i>	1	
<i>Vampyroteuthis infernalis</i>	1	
<i>Magnapinnidae</i> new species	1	
Total	240	

Catch statistics of leg 2 (southern area towards Azores)

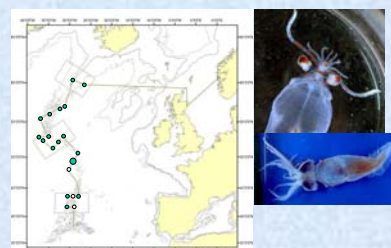
Cephalopod diversity indices. Station numbers are from north to south. Note: the indices increase towards the south emphasising the importance of cephalopods in the sub-tropical parts along the northern mid-Atlantic Ridge system.



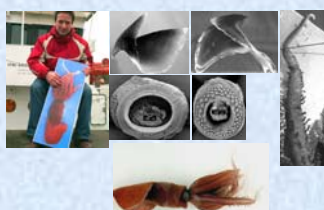
Distribution pattern of *Gonatus* spp.



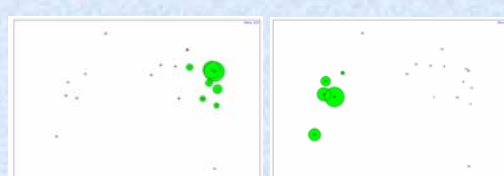
Distribution pattern of *Heteroteuthis dispar.*



Distribution pattern of *Teuthowenia megalops.*

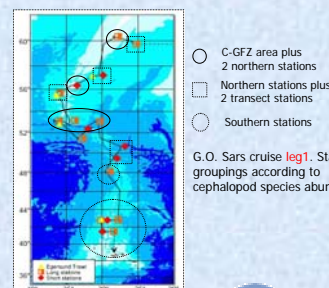


We discovered a new species of *Promachoteuthis* (Vecchione *et al.* in: Proc Biol Soc Washington 119)



G.O. Sars cruise leg1. Station grouping according to cephalopod species abundance (mds plot). The occurrence of *Gonatus fabricii/steenstrupi* is marked in green.

G.O. Sars cruise leg1. Station grouping according to cephalopod species abundance (mds plot). The occurrence of *Heteroteuthis dispar* is marked in green.



G.O. Sars cruise leg1. Station groupings according to cephalopod species abundance.